Paper No. 27

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WILLIAM R. RICHARDS, JR. and MICHAEL W. DENNEN

Appeal No. 2003-1973
Application No. 09/192,952

ON BRIEF

Before KIMLIN, PAWLIKOWSKI and MOORE, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-19 and 21-23.

Claim 1 is illustrative:

1. A Fermi-threshold field effect transistor (Fermi-FET) comprising:

spaced apart source and drain regions in an integrated circuit substrate;

> a Fermi-FET channel in the integrated circuit substrate, between the spaced apart source and drain regions;
>
> a gate insulating layer on the integrated circuit substrate, between the spaced apart source and drain regions; and
>
> a gate electrode on the gate insulating layer, wherein the gate electrode is closer to the source region than to the drain region and wherein the Fermi-FET is free of other electrodes between the source and drain regions.

The examiner relies upon the following references as evidence of obviousness:

Dennen	5,543,654	Aug. 06, 1996
Matsumoto et al. (Matsumoto)	5,599,741	Feb. 04, 1997
Mori, et al. (Mori)	JP 11-317519	Nov. 16, 1999 (filed May 01, 1998)

Unagami, T. "High-Voltage Ply-Si TFT's with Multichannel Structure" IEEE Transactions on Electron Devices, Vol. 35, no. 12 (December 1988), pp. 2363-2367.

Appellants' claimed invention is directed to a Fermi-threshold field effect transistor (Fermi-FET) comprising a gate electrode and spaced apart source and drain regions wherein the drain region is offset. According to appellant "[o]ffset drain Fermi-Fets may be used, for example for high voltage and/or high

frequency operation" (page 3 of principal brief, second paragraph).

Claims 1-19 and 21-23 stand rejected under 35 U.S.C. § 103 as being unpatentable over Dennen in view of Matsumoto.

Appellants submit at page 3 of the principal brief that "[c]laim [sic, claims] 1, 7 and 13 along with dependent Claims 2-6, 8-12 and 14-19 may be grouped together" and "dependent Claims 21-23 also may be grouped together and are separately patentable." Accordingly, claims 7, 13, 2-6, 8-12 and 14-19 stand or fall together with claim 1, and claims 22 and 23 stand or fall together with claim 21.

We have thoroughly reviewed each of appellants' arguments for patentability. However, we are in complete agreement with the examiner that the claimed subject matter would have been prima facie obvious to one of ordinary skill in the art within the meaning of § 103 in view of the applied prior art. Accordingly, we will sustain the examiner's rejections for essentially the reasons set forth in the answer, and we add the following primarily for emphasis.

There is no dispute that Dennen discloses a Fermi-FET having the claimed features with the exception of having an offset drain region. Also, appellants acknowledge that Matsumoto is evidence that it was known in the art to offset the drain region in a field effect transistor (FET). Accordingly, based on these undisputed facts, we must concur with the examiner that it would have been prima facie obvious for one of ordinary skill in the art to modify the Fermi-FET of Dennen to have an offset drain region for the purpose of lessening the electric fields near the drain region in order to prevent avalanche breakdown, as taught by Matsumoto. In our view, absent objective evidence to the contrary, since both Dennen and Matsumoto are directed to field effect transistors, one of ordinary skill in the art would have found it obvious to employ a known feature of a field effect transistor, namely, an offset drain region, in the field effect transistor of Dennen.

Appellants submit that "it would not be known that an offset drain could be added to a Fermi-FET transistor or conversely, a Fermi-FET transistor could be equipped with an offset drain,

which can allow a combination increased breakdown voltage immunity and increased transconductance" (page 6 of principal brief, second paragraph). This argument, however, is directed to the novelty of using an offset drain region in a Fermi-FET transistor but not to the issue at hand, i.e., its obviousness. As for the provision of increased breakdown voltage immunity and increased transconductance, it is not necessary for a finding of obviousness that the prior art recognize all of the advantages of a claimed invention. It is sufficient that there would have been some motivation for one of ordinary skill in the art to make the combination. In the instant case, the motivation arises from a reasonable expectation that offsetting the drain in Dennen's FET would prevent avalanche breakdown.

Appellants also maintain that "[t]he unexpected characteristic of a simultaneous improvement in breakdown voltage immunity and an increase in transconductance, provides evidence of nonobviousness of offset drain Fermi-Fets according to embodiments of the present invention." (page 7 of principal brief, last paragraph). Appellants present a figure at page 8 of the principal brief "which is a reproduction of Figure 26 of the

present application, with the transconductance of a conventional surface channel inversion MOSFET overlaid" (second paragraph). First, the figure in appellants' brief is of minimum probative value inasmuch as it is not one of the figures of the present specification, nor is it in declaration or affidavit form. Consequently, it is entitled to no more weight than an argument of counsel which, of course, cannot take the place of objective evidence. In re Pearson, 494 F.2d 1399, 1405, 181 USPQ 641, 646 (CCPA 1974). Furthermore, appellants have conceded the validity of the examiner's criticism that the figure fails to provide a showing of a Fermi-FET with an offset drain vis-a-vis a conventional FET with an offset drain. According to the examiner, the figure shows only a conventional FET without an offset drain. In response, appellants thanked the examiner in the Reply Brief "for providing this additional insight" and provided an additional figure with two additional curves (see page 2 of Reply Brief). Again, the additional figure is entitled to no more weight than an argument by appellants' counsel since it is not in declaration or affidavit form. In addition, appellants have furnished no evidence that the results depicted

in the figure would have been considered truly unexpected by one of ordinary skill in the art. In re Merck & Co., 800 F.2d 1091, 1099, 231 USPQ 375, 381 (Fed. Cir. 1986). It is well settled that the burden of establishing unexpected results is on the party asserting them, and we do not find that the present appellants have satisfied this burden. Indicative of this is appellants' characterization of the figure in the Reply Brief in terms of "what appears to be unexpected" (page 3 of Reply Brief, second paragraph). Accordingly, it is our determination that the prima facie case of obviousness established by the examiner has not been rebutted by appellants.

In conclusion, insofar as appellants have not demonstrated that one of ordinary skill in the art would have been dissuaded from offsetting the drain region of a Fermi-FET for the advantage taught by Matsumoto, and appellants have not rebutted the prima facie case of obviousness with objective evidence of nonobviousnes, the examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

EDWARD C. KIMLIN Administrative Patent Judge	)	
BEVERLY A. PAWLIKOWSKI Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
JAMES T. MOORE Administrative Patent Judge	)	

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